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Abstract

Objective and study: Fresh bovine colostrum (BC) prevents development of necrotizing enterocolitis (NEC) in preterm pigs. Spray drying and pasteurization are required to use BC in clinical settings but this may also reduce its bioactivity. In studies on preterm pigs, we compared raw BC with spray dried and pasteurized BC.

Methods: Preterm pigs were fed total parenteral nutrition for 2 d, followed by two boluses of milk formula (15 mL/kg/3h) and continued enteral feeding with milk formula (FORM, n = 14), fresh BC (COLOS, n = 14), spray dried, powdered BC (POW, n = 8), or spray dried, pasteurized BC (POWPAS, n = 9). Pigs were euthanized after two days of enteral feeding and NEC lesions, intestinal structure, digestive and absorptive functions, microbiota, and tissue protein and mRNA levels of immune factors were analyzed. Finally, we determined the concentrations of some bioactive proteins in the colostrum products and studied treatment-related aggregation of proteins.

Results: POW and POWPAS pigs showed lowered gut NEC severity, IL-1β and IL-8 levels and lactic acid levels, and higher intestinal villus heights, hexose absorption, hydrolase activities (lactase, maltase, peptidases) than FORM pigs (all $P < 0.05$). These values in POW and POWPAS groups were similar to those in the COLOS group. Intestinal expression of *IL1B*, *IL6* and *IL8* and bacterial abundance score were positively correlated with NEC severity ($P < 0.05$). Spray drying, and especially pasteurization, increased the breakdown of growth factors (TGF-β1 and -β2) and aggregation of milk proteins.

Conclusion: Spray drying and pasteurization affect BC proteins but such treatments do not necessarily decrease its trophic and anti-inflammatory effects on the immature intestine. It remains to be studied if such colostrum products also improve gut maturation in preterm infants.